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COMMUNICATIONS, ORIGINAL AND SELECTED.

For the Belfast Monthly Magazine.

Remarks upon Sir Humphry Davy's late proposal of the substitution of Oxy-muriate of Magnesia for the Oxy-muriate of Lime, in the processes of bleaching Linen and Cotton Cloths; with some Experiments to prove that his Statement that Muriate of Lime possesses a corrosive action upon the Vegetable Fibre, and destroys the Cloths, is incorrect.
By James Ogilby, M.D.

HAVING observed in a former Number of your Magazine, that remarks upon the subject of bleaching would be at all times acceptable from your chemical readers, no apology, I conceive, is necessary, upon my part, for introducing to the notice of the gentlemen concerned in the bleaching business, (amongst whom I understand your Magazine has an extensive circulation,) a discussion, or rather controversy, which at present exists, relative to the application of the salt called *oxy-muriate of magnesia*, to the purposes of whitening linens and cottons, in preference to the oxy-muriate of lime, long in general use for the same purposes, but which, according to Professor Davy, cannot be employed without very material injury to the texture of the cloth.* A few months ago I had the honour of reading a communication upon this subject to

the Kirwanian Society of Dublin, in which I endeavoured to show that not only were Professor Davy's arguments in urging the necessity of the adoption of his new proposal, altogether fallacious, but I adduced experiments to prove that his assertion that muriate of lime injured the texture of linen could not be received as fact, as it must have been founded upon an inaccurate experiment.† The results of my experiments on the different samples of linen which had undergone immersion in strong solutions of muriate of lime, were laid before the Society, and examined by several of the members who were conversant with chemical subjects. A short abstract of this communication having appeared soon after in one of the periodical journals, a reply containing much asperity of remark, with little or no argument, appeared the following month in the same journal; which reply I have traced to the laboratory of the Royal Institution in London, and thence infer, with no little probability, that it must have been dictated by the Professor, and published with his permission.‡ Under these circumstances I feel it incumbent upon me to bring the facts and circumstances connected with this subject fully and fairly before the gentlemen of the linen trade in the North of Ireland, as they are the most likely persons to take an inter-

* Elements of Chemical Philosophy; by Sir H. Davy.
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† Philosophical Magazine—May, 1812.
‡ Philosophical Magazine—June, 1812.
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rest in the subject, and many of whom I have had opportunities of knowing to be well acquainted with the chemical principles upon which the art of bleaching depends.

If discussions of this sort are not directly productive of profit, in the mercantile sense of the word; they may be said to be indirectly advantageous, not only in familiarizing us with the scientific principles, so indispensably necessary to the improvement and prosecution of many of the most useful arts, but in tending to produce what is not less valuable—that jealous and vigilant examination of every suggestion or assertion which may carry much apparent weight, from its association with any of the distinguished names in science, whether of mere fortunate discoverers, or those who are infinitely their superiors, by possessing a comprehensive and profound knowledge of the sciences which they profess ; for " it may be said with truth, that no man is able permanently to injure a science by the introduction of absurdities, excepting one who has contributed essentially to its progress and celebrity."*

It is my intention to show in what follows, as concisely as the subject will admit, that the substance proposed by Sir H. Davy as an improvement in the bleaching art, is inapplicable and superfluous ; that it had been examined, proposed, and afterwards discarded, more than 13 years ago ; that the alleged fact upon which the proposal rests is founded upon an inaccurate experiment ; and that in its application to the process of clearing in calico printing, Sir Humphry had been anticipated nearly three years by a gentleman in the west of Scotland.

During the course of electro-chem-

ical lectures which Professor Davy delivered in the Dublin Society's laboratory, at the close of the year 1810, when treating of the *bleaching gas*, (oxy-muriatic acid) and its combinations, he expressed himself with his usual modesty as feeling extremely happy that he had it in his power, in return for the great attention and politeness he had experienced in Ireland, to suggest, for the first time, an improvement in the art of *bleaching*, which he conceived would be of great national advantage. In treating of the simple solution of the oxy-muriatic gas in water, without, the intervention of any earthy basis, he argued, that such a liquor could not be employed without much detriment to the linen ; for when the gas is decomposed, and its oxygen, or the oxygen of the water imparted to the colouring matter ; that as the liquor must then, as every chemist knows, be a solution of *muriatic acid*, it must inevitably corrode the fibres of the cloth.† Upon the same principle the steeping liquor of the oxy-muriate of lime, which has been generally used for the last 12 years, he mentioned, after it had exerted its true bleaching power, the linens must remain in a solution of simple *muriate of lime*. He then advanced what he imagines is a new fact, and which it seems had escaped all former chemists, that a strong solution of muriate of lime will injure the texture of linen steeped in it materially ; rot it, or render it unsound, as he said he found by experiment.‡ Now, said he, (using a mode of reasoning quite *unique*, and novel in chemistry,) if a strong solution of *muriate of lime* rots linen cloth, a weak one must be proportionally detrimental ; and it therefore follows, that the oxy-muriate of lime

* Thomson's History of the Royal Society.

† Davy's Lectures.

‡ Elements of Chemical Philosophy.

cannot be used with safety in bleaching. A substitute then becoming necessary in the opinion of the Professor, he had the pleasure of communicating to his audience that the oxy-muriate of magnesia did not possess any of those destructive properties, or that the resulting muriate of magnesia had not the least injurious action upon linen cloth. He had no objection to the oxy-muriate of pot-ash but its greater expence than oxy-muriate of lime, for the muriate of pot-ash is a perfectly inert substance.

Except a story of an apothecary who found a cotton cloth rotten after drying crystals of muriate of lime upon it, nothing farther was advanced by the Professor, (as very accurate notes of his lectures can testify,) to show the bleacher the utility of embracing his great improvement, or to convince him of the necessity of rejecting an article (the oxy-muriate of lime) from his process, which has been used in every part of the Empire for the last 12 years, in whitening even the most delicate fabrics with perfect safety.

The following year, 1811, the Professor repeated his course of lectures, and his proposal at the Dublin Society. He was now happy to find, as he expressed himself, that he could advance matter in confirmation of the propriety and utility of the improvement he had proposed a year before; and he produced a letter, not from a bleacher, as one might have naturally expected, but from a very respectable *calico printer*, stating that he had employed the oxy-muriate of magnesia with some success in whitening the grounds of some delicate dyes, as yellows, and tints of madder reds, and that he considered the process preferable to the common one of boiling in bran water, and exposure to the sun and

air, or the process with the oxy-muriate of lime or pot-ash. In this letter it is worth remarking, that there was not a word of bleaching or removing the natural colouring matter of the cloth, no mention of the supposed injurious action of *muriate of lime*, which had led to the original proposal; it merely related to a partial and confined operation connected with calico printing, respecting which Professor Davy had not thrown out a single hint the year before, and which application of this substance to the process of clearing had been suggested by a Mr. Ramsey of Scotland nearly 3 years before, and had been practised by several calico printers in both countries.

I shall now proceed to examine the different statements, arguments, and the alleged *fact* which the Professor has adduced, with the view of introducing what he conceives to be an important alteration in the practice of an art so intimately connected with the staple manufacture of Ireland. The learned Professor has asserted that the principal circumstance to be attended to by the bleacher in using those oxy-muriatic salts, and from what he is to apprehend the principal danger, is the substance or residuum which is left in the bleaching liquor after the salt has exerted its true whitening property.* Now I apprehend there can be no assertion more erroneous than this; for supposing the residual substance to be one of those which in its concentrated form or undiluted state would instantly destroy the texture of sound linen; yet if it is diluted to a certain degree it will have no perceptible or injurious action. It must be this error which has led Professor Davy into the sup-

* Elements of Chemical Philosophy; by Sir H. Davy.

position that it was owing to the resulting muriatic acid that the use of the simple solution of the bleaching gas was generally discontinued;* but this is not the case; nor is such a reason for its non-employment stated by any of those authors who have attended most and written best upon the subject; for though a very strong liquid muriatic acid will soon destroy linen, yet it does not follow that in the high state of dilution in which it must exist in the bleacher's steeping liquor when properly prepared, that it can have any sensible action upon the goods; and every one knows how easily removable this acid is by water in the succeeding operation of washing. The use of chalk, lime, and the alkalies, was introduced in practice for the sole purpose of condensing or restraining the volatility of the gas, and thus obviating its pernicious effects upon the lungs of the workmen; and it is allowed by the best chemists that this condensation is not unattended with disadvantage; for at the same time that its pernicious properties are counteracted, a considerable part of the bleaching power of the gas is lost by the combination.† Similar objections obviously apply to the Professor's reasoning respecting the oxy-muriate of lime; he finds, he says, that a strong solution of muriate of lime rots linen cloth; and he then uses the singular chemical logic, that a weak solution must also be detrimental; but if there was the slightest validity in this assertion, what would become (as I had occasion to remark in my paper before the Kirwanian Society) of every in-

* This solution is yet used in France by several manufacturers, in preference to any of the combinations of the bleaching gas.

† *Chimie Appliquée aux Arts, par Chaptal.*

gredient essential to his art, which the bleacher employs. Strong sulphuric acid (oil of vitriol) will instantly char and destroy linen; nevertheless, a weak solution of it in water is used often 3 or 4 times in the process with perfect safety.

Caustic pot-ash in strong solution will, in like manner, very quickly reduce and injure the texture of linen, yet, when properly diluted, it is an indispensable and safe agent in bleaching.

It would be useless to multiply the instances in which the absurdity of such a conclusion as that to which I have adverted is manifest. Every medical student knows, that weak sulphuric acid is daily taken into the human stomach, to strengthen, not to injure it, while in the strong state, death would inevitably follow its application to that organ. Mr. S. Witton, of Chester, who is extensively engaged, and of much experience in the Chemistry of the Arts, was kind enough to try at my request several experiments upon the oxy-muriate and muriate of lime. He finds, after a trial of different samples of the bleacher's salt of commerce, that the average product of real oxy-muriate of lime in 240 grains is only 87 grains. Allowing, however, the quantity of real bleaching salt to be somewhat larger than this in the produce of some manufactories, it follows, considering the state of dilution in which the bleachers employ it, that not more than one part of muriate of lime to 1500 or 2000 parts of water can ever exist in the residual liquor of the bleachers; a proportion, which were it even granted, that a strong liquor of muriate of lime had powers nearly as active as aqua fortis, it would be quite ridiculous to suppose, that in such a state of dilution it could exert the smallest corrosive property upon the linen. Conceiv-

ing it to be extremely improbable, that a neutral combination of muriatic acid with lime, or the salt called *muriate of lime*, possessed such a caustic property as materially to injure the texture of strong and sound linen cloth, I had the curiosity, (granting for a moment that such a fact was applicable to the question of bleaching,) to make a series of experiments, which have been already given in detail to the Kirwanian Society.* Desirous of affording every opportunity for the exertion of any corrosive property, which the muriate of lime might be imagined to possess, I selected a cutting of sound and *full bleached* Colerain linen, in which, of course, as the colouring matter had been removed, there was nothing to impede the supposed action of the salt upon the fibres of the yarn. This cutting being separated into several parts, and one being retained as a standard of comparison, the others were steeped in strong solutions of *neutral* muriate of lime, some of which approached to a state of saturation. Each steep was continued for twenty-four hours, when the linen was carefully washed, dried, and examined by comparison with the standard specimen, found perfectly sound, and not perceptibly reduced in texture. These operations were repeated upon each specimen for four successive steeps, in fresh solutions of equal strength with the first, and at the end, I found the linen perfectly uninjured, and not to be torn with less force than the unsteeped piece. In fact, the muriate of lime has no more action upon linen cloth, than muriate of soda or common salt, a comparative experiment which I made, though with little or no doubt of the result. As a notion might be entertained by some, that the existence of an at-

tractive force between the earthy basis of the salt and the vegetable fibre, would produce a decomposition and a disengagement of free muriatic acid to act upon the linen, I repeatedly tested the liquors with litmus during the immersion, but could not detect any acid. It has since been asserted, upon the part of Professor Davy, in the reply I have already adverted to, by an operator in the laboratory of the Royal Institution, that he repeated my experiments, and he found, that a single steep in *muriate of lime* was sufficient to rot the full bleached linen he used! Such a striking discordance of result, in experiments so simple and easily conducted, naturally led several persons interested in the business to examine the subject for themselves. Mr. Wittor informs me, that he has steeped both linen and cotton in very strong solutions of muriate of lime for five days, without the slightest injury to the texture. Mr. M. Donovan, of this city, who has been much accustomed to experimental researches, and who assisted Mr. Davy at his lectures in Dublin, has repeated these experiments, with attention to every precaution that was requisite, he has not only steeped the linen in cold solutions of the salt, but tried to increase any active power it might have by the aid of a boiling temperature; his results were similar to Mr. Wittor's and mine. Mr. Donovan, from being unaccustomed to try the strength of linen, was diffident of depending upon his own judgment, and he consequently submitted his samples to trial by several experienced linen-drapers, who were unanimous in pronouncing them perfectly sound.

How then can those contradictory experiments be reconciled? Professor Davy and his operator assert, that a *single steep* of linen cloth in a

* Philosophical Magazine for May, 1812.

strong solution of muriate of lime, is sufficient to rot it, while three experimenters upon the other hand have found, that four or five successive steepings in fresh solutions do not perceptibly injure it. Is it possible to suppose, that the Professor has used in his experiments a salt with excess of muriatic acid, or that some of the unsound linen, the refuse of the Irish bleacher, which is sold in London for hat-linings, and other such uses, may have fallen into his hands? I cannot perceive any other way of explaining his extraordinary results. It has been lately thought proper to deny, that Professor Davy ever asserted, that a weak solution of muriate of lime possessed any portion of the detrimental properties of a strong solution. Now unless the Professor thought such an inference deducible from his supposed fact respecting a strong solution, it is not possible to conceive how that pretended fact would be introduced or connected with the question of bleaching, for it is well known, that a strong solution of that salt never occurs to the bleacher in any part of his process. But I have elsewhere adduced evidence to show that my first assertion is correct. His operator says, that it was the well known principle of the more energetic action of bodies when in their *nascent* state, that the Professor advanced upon this subject against the use of the oxy-muriate of lime. Let us examine for a moment, if this familiar principle has the least bearing upon the point in question. The bleacher's salt (oxy-muriate of lime) is, according to a new *hypothesis* of the Professor, a triple compound of chlorine, (oxy-muriatic acid,) oxygen, and the metal of lime called *calcium*. Now as soon as this compound imparts its oxygen to the colouring matter, a muriate of lime will be separated, which at the moment of

its separation, or in its *nascent* state, may, with the assistance of a strong imagination, be conceived to seize upon and destroy the linen. It must be obvious to the merest *Tyro* in the science, that though the principle of the *nascent* state is in chemical actions *something* more than a speculation, yet that its application in this instance is *nothing* more. The muriate of lime, among the long catalogue of salts, is one of the most soluble, or in other words, has a powerful attraction for water, it would, therefore, be quite absurd to suppose, that when it is surrounded with millions of particles of water, it would first obey an inferior attraction, and act upon the linen in the solution. Let us at the same time not forget, that supposing there was the smallest weight attached to such a conjecture, that it is at the same time taking for granted the deleterious action of the muriate of lime, which has been already proved to be unfounded.

Accidents have frequently occurred at the first introduction of the bleaching gas and its combinations, similar to those which have happened at the introduction of oil of vitriol and potash; nor is such a consequence to be wondered at. It takes a considerable time before the uneducated foremen bleachers can acquire sufficient skill or experience to use such energetic agents with perfect safety. It is surely an argument that Sir Humphry Davy, or no other enlightened person, could advance against an eligible and applicable material in bleaching, that it should be rejected because the foremen were too ignorant and inexperienced to commence the use of it without some danger. Had such an obstacle been thrown in the way of oil of vitriol and potash, at their first introduction, we should be at this day bleaching linens with bran and

buttermilk, and months of exposure on the grass instead of days. It may not be useless to state a proposition upon this subject, which seems to have been totally lost sight of by Professor Davy; to wit, that there is no substance whatever which has an attraction to the colouring matter of linen cloth, and is soluble in water, let its action in its undiluted state be powerful and corrosive in the highest degree, that may not be used by proper dilution without the smallest injury to the cloth.

A short time subsequent to the introduction of the new or French mode of bleaching into this country, an investigation respecting the causes which produced a considerable quantity of damaged linen, took place before the Linen Board. Having been examined as a witness during that investigation, I had occasion to produce one or two instances in which linens had been tendered by the improper use of the bleaching gas in solution. But the result of this inquiry was, that though a portion of the damage sustained was owing to the unskilful use of the new mode, yet a much larger portion was attributable to other circumstances, such as the remarkable drought of the season when those linens were bleached, and to the use of a certain compound (the *detergent salt*) which had been proposed some time before as a substitute for potash, by a company of industrious Scotchmen, but which turned out to be nothing more than disguised *lime*, against the use of which in bleaching there was an act of Parliament still in force. Being at that time a student in the Chemical school of the Dublin Society, and engaged in a series of experiments on bleaching with Professor Higgins, I was fortunately the means of detecting by analyses the composition of this substance, which I found to consist of five-eighths lime,

and three-eighths common glauber salts. The latter ingredient has no more efficacy in bleaching than common chalk, and was part of the refuse of the manufacture of bleaching salts, (*oxy-muriate of lime*), which was conducted by the same company. Most bleachers are acquainted with the powers of lime as an agent in their art, and the accidents which are likely to happen from its use, when directly applied to their cloth. The result of this analysis was laid before the Linen Board during their investigation, and the consequence was, that the manufacture of the Scotch *detergent salt* was very soon relinquished, and the industrious proprietors left the country. The *oxy-muriate of lime* must now be considered as an applicable and perfectly safe ingredient in bleaching, and accordingly I find that it is now in pretty general use in the North of Ireland among the bleachers, and is daily extending. Three extensive manufactories of the salt in the North are constantly at work for this purpose, besides a large supply from Dublin and other places.

It may not be useless to remark, that considering the great solubility of *muriate of lime*, that it is scarcely possible, that a single particle of it can remain adhering to the cloth after the washing which it undergoes after every operation. There is nothing, therefore, to be feared from a *sulphat of lime* being formed in the after process of souring. There is always more than 500 parts of water to take up the salt, if formed, and it is quite harmless in all processes of mere whitening, though the calico printer may conceive it to be inimical to the success of some of his operations.

Let us consider also, that the most delicate fabrics, as muslins, &c., daily undergo the operation of steeping in the *oxy-muriate of lime* with-

out injury, though Professor Davy now thinks proper, from an imaginary property, to interdict its application even to the strongest fabrics, 12 years after its general employment in every part of the Empire. If there was the least foundation for this notion of the Professor's, that the oxy-muriate of lime cannot be used with safety, the consequence that would directly follow from it would be somewhat serious; it would be this, that all the linens and cottons to which it had been applied for the last 12 years must be absolutely rotten. It becomes, therefore, a matter of some importance, as well for this as for various other reasons, to contradict such an assertion, immediately after proving that it has not the smallest foundation in fact. With regard to the practicability of employing the proposed substitute, the *oxy-muriate of magnesia*; supposing for a moment that it were necessary, it may be worth while to say a few words. It is perfectly evident that it is not only the interest of every bleacher to bring his goods perfectly sound to market, but to meet his competitors in the trade upon equal terms, and to adjust his prices, if possible, to the demand. It would consequently be ruinous for one bleacher to use an ingredient 5 or 6 times dearer than another which is in general use; and yet, extraordinary as it may appear, Professor Davy seems to have forgotten completely a circumstance so obvious; and he proposes to the bleacher an article for his process, which there is no known means of procuring at less than 4 or 5 shillings per pound, though inferior in every respect to the oxy-muriate of lime, which is only at 8d. per pound! Lime is not one farthing per pound, while magnesia, the corresponding ingredient in Sir Humphry's proposed salt, is not less than 2 shillings. The Pro-

fessor indeed says in a very general way, without giving any clue, or specifying any process, that magnesia might be reduced in price, (he does not mention to what extent) by procuring it from the *bittern* of the salt pans. I have visited a manufactory of magnesia in this city, and find that though the proprietor uses this liquor, he is not enabled to reduce the price much below 2 shillings per pound. Having heard that Sir Humphry Davy's project was to precipitate the *bittern* by lime water. I requested the proprietor to make a trial of the practicability of such a plan; the precipitate he found as might be expected, not pure magnesia, but a mixture of magnesia, with sulphat of lime, (gypsum); and after calculating the expence of the very large vessels that would be requisite in such a process; that the *bittern* would rise in price in proportion to the demand for it; and considering all the circumstances, he gave the proposal his decided negative.

It has also been thrown out by the Professor, that as muriate of magnesia is easily decomposed by heat, or its acid easily driven off, that the same magnesia might be repeatedly used for the manufacture of the oxy-muriate. This idea does not deserve a moment's consideration, unless the bleacher had coals at 5s. per ton; for it would be necessary before we procured the salt for decomposition, to expel by evaporation, 1500 or 2000 parts of water.

Professor Davy has stated this proposal as if the idea was entirely new, and belonged to himself, for he does not make the slightest mention of any former proposer, though Mr. Higgins, in the course of some bleaching experiments, had formed the salt nearly 16 years before; tried its whitening property, found it inferior to the salt of lime, and gave it

up as quite beyond the reach of the bleacher, from the enormous expence that would attend its application to the process. Mr. Tennant of Glasgow proposed the same salt 13 years ago; mentions it in the specification of his patent for bleaching, among other similar substances; but it was soon found to be so inferior and ineligible, compared to the salt of lime, that it has lain ever since entirely and deservedly neglected.*

It is singular enough that the learned Professor passed over the oxy-muriate of pot-ash, (still in use by some bleachers) without any other objection to it than its greater expence than the salt of lime; for it cannot be said to leave any residual salt with caustic properties, as the muriate of pot-ash is a neutral inert substance.†

But how he could come to propose an article almost in the same breath, four or five times more expensive than it, appears perfectly unaccountable.

I understand that during his stay in Dublin, the Professor had an interview with the trustees of the linen manufacture, upon the subject of bleaching; but I have not been able to learn that they have since thought proper to take the slightest notice of his new proposal, or to give any prohibitory directions or cautions to the bleachers against the use of the oxy-muriate of lime. And it is a fact, that to this day not a single bleacher in Ireland thinks it his interest to use the magnesian salt.

I think it is now clearly proved by what is stated above, that the introduction of the oxy-muriate of magnesia as an agent in the bleaching art, is both unnecessary and impracticable; and that the arguments and the solitary experiment upon which

it was propped up are fallacious and incorrect.

With respect to the use of this salt by the *culico printer* a few yards will be sufficient. In December, 1811, Professor Davy read a letter to his audience, from Mr. Duffy of Ball's Bridge, near Dublin, in which it was stated, that in clearing the white grounds of delicate madder dyes, he had used the oxy-muriate of magnesia with apparent success. From the satisfaction with which the Professor communicated this information to his audience, it was evident that he considered this as a proof that the magnesian salt was applicable to *bleaching*, and confirming the idea he had thrown out the year before, though Mr. Duffy wrote in the very same letter that in the general business of bleaching, Mr. Tennant's oxy-muriate of lime had left the bleacher nothing to desire as a substitute for that article; and he did not take the slightest notice of Professor Davy's fundamental fact, that the muriate, and consequently the oxy-muriate of lime was injurious to his cloth.

By referring to the Elements of Chemical Philosophy, by the Professor, it may be seen that he, in consequence of this letter of Mr. Duffy's, considers himself as the author of this supposed improvement in the process of dying; though he had not given a single hint upon the subject in his first course of lectures in Dublin.

Upon consulting the article "bleaching," in the Edinburgh Cyclopaedia, I found to my surprise, that all the principles upon which the propriety of the application of the magnesian salt to the practise of *clearing* depended, were clearly stated in that work, and that it was alluded to as a practise of some standing in Scotland. Having requested a friend to make some inquiry upon this subject in

* Repertory of Arts, first series, 13th vol.

† Davy's Lectures.

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that country, the proprietor of the Cyclopedias was so obliging as to procure the fullest and most explicit information.

The result is shortly this, that Mr. Tennant of Glasgow was the first person who proposed the application of the oxy-muriate of magnesia to bleaching; and that Mr. Ramsey, near the same place, was the first who proposed it in the calico printers' process of clearing, nearly three years before Professor Davy had taken the least notice of it. Mr. Ramsey communicated his ideas upon the subject to a Mr. Arthur of Leven Bank; and shortly after several calico printers commenced the use of it.

I have the satisfaction also, in consequence of the same inquiry, of giving it as the opinion of the most experienced bleachers in Scotland, that the oxy-muriate of lime is an ingredient perfectly applicable and safe in bleaching both linens and cottons.

From what has been stated already it will not be difficult for your chemical readers to form a just estimate of what Professor Davy considers as his proposals to improve the processes of bleaching, and calico clearing. It will be evident that in the former, which has been long deservedly neglected as altogether nugatory, he has been anticipated by Mr. Tennant not less than 11 years; and in the latter, which would appear to be of some utility, by Mr. Ramsey three years.

Having already extended this letter to what I fear will be considered an unreasonable length, I am obliged to reserve other matter connected with this subject for a future communication.

After the very coarse attack upon my first paper upon this subject, already adverted to as coming from under the eye of the Professor of

Chemistry to the Royal Institution, I conceived it necessary, in justice to myself, to enter into the full discussion of the subject, which, though not likely to be extremely palatable to my opponents, may not be quite uninteresting to some of your readers. Permit me to conclude with observing, that it would be a most desirable circumstance if a Professor of any of the sciences, when he thinks it necessary to employ any of his junior pupils as an instrument to relieve him from the irksome task of defending his supposed discoveries, and attempting to repel the unanswerable arguments of an adversary, he would at the same time give him the useful advice, to learn at least something of the subject upon which he is about to commit himself to the public, and thus qualify himself to give something more in reply than coarse invective, false accusations, and erroneous experiments.

I should be glad also that upon the subject of bleaching, the best authors were consulted and read with more care at the Royal Institution than Van Helmont's book was, preparatory to the description of Professor Leslie's differential Thermometer, which is given in the Elements of Chemical Philosophy.*

JAMES OGILBY.

16, More-street, Dublin.

24th Sept., 1812.

To the Proprietors of the Belfast Magazine.

"If I one soul improve, I do not write in vain."

WHEN any subject occupies much of our thoughts and attention, we frequently err in supposing that

* See Professor Leslie's letter to the editor of the Caledonian Mercury.